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A PELLET OF PLANT SEED, A METHOD OF PELLETIZATION AND A CULTIVATION METHOD OF PLANTS USING THE SAME

TECHNICAL FIELD

The present invention relates to a pellet of plant seed, a pelletization method and a cultivation method of plants using the same. More particularly, it relates to the pelletization method of plant seed by forming to insert a plant seed in that by using peatmoss, drying the formed mixture and inserting the plant seed into it, the pellet with plant seed prepared by said method and the cultivation method of plants by sowing the pellet with plant seed in a soil surface.

BACKGROUND ART

Sowing and a cultivation of plant seed have been developed through research to many steps, but there are still problems to be solved. The cultivation of plants comprises many steps such as sowing, raising seedling, fertilization and controlling noxious insects and needs many labors, costs and times. Also, it needs a scientific and an experiential knowledge for treatment of plant seed.

A peatmoss often used in the technical field of the present invention is an organic material that is pile of rotten reeds of swamp or marsh in a cold region. The peatmoss has 15 times of moisture absorption compared with dry condition and an excellent aeration. In addition, it is light and has no side effect such as chemical reaction on fertilization, so it is generally used in sowing plant seed, production of seedling and cultivation.

On the other hand, in the technical field of the present invention, a pellet is prepared by coating surface of plant seed with a mixture comprising nutrients for germination and growth promotion of plant seed. An object of the pelletization is an

enlargement for mechanization of micro-seed and a protection from harmful insect or bacteria for germination promotion and seedling. In the prior art, a pellet of plant seed was generally prepared by coating surface of plant seed with treated material severally. The pellet with plant seed prepared by said method is not effective. In addition, it has an economical problem and troublesomeness because the material for pelletization does not function as soil, so it is necessary to cover with earth again after sowing seed.

Also, the peatmoss used as a material for pelletization reduces labors and times to cover with soil again because it functions as soil. However, addition of water happens in the pelletization process, the water is absorbed into the seed and expands germ and endosperm. Finally the seed coat is exploded and germinated. Drying in the process of storage after those physiological activation makes the seed to be happened a physiological impediment to effect germination in the sowing, as a result of that, germination rate drops. Therefore, the removal of water is a technical subject in the pelletization process using peatmoss.

To solve said problem in the prior art, it has been used a method which is coated surface of plant seed with materials comprising mud, phosphate powder, lime powder and water-soluble Arabic gum severally by glue and dried. However, the method could not be used to all kinds of seed, especially bulbous plants, because materials for growth such as fertilizer for growth, plant growth regulator, bactericide and insecticide are not together with smoothly.

In order to solve the problem for removal of water from the pellet, as mentioned hereinabove, the present invention prepared a pellet with plant seed by pressing and forming from using peatmoss and plant growth regulator etc., drying the formed mixture, making a hole to it, inserting a plant seed into it and sealing them. Accordingly, an object of the present invention is to provide the pelletization method of plant seed. Another object of the present invention is to provide pellet of plant

seed obtained by said pelletization method. A further object of the present invention is to provide the cultivation method of plant using said pellet with plant seed.

DISCLOSURE OF THE INVENTION

The present invention is achieved by the method as follows; pelleting a plant seed by adding various materials, sowing the pellet with plant seed in various methods and confirming excellent effects of said pellet with plant seed by investigating the germination rate of plant seed, the germination number day by day and the condition of growth.

A pelletization method of plant seed according to the present invention, which comprises the steps of:

a) mixing one or more selected from the group consisting of fertilizer, plant growth regulator, bactericide and insecticide with peatmoss using water-soluble glue;

b) forming a mixture of a) step to insert a plant seed in that;

c) drying the mixture formed from b) step; and

d) making a hole to said dried mixture, inserting the plant seed into it, pressing and sealing them and obtaining the resulted pellet with plant seed inserted.

Hereinafter, the steps of the pelletization method of plant seed according to the present invention will be in detail described in the below.

STEP 1

One or more selected from the group consisting of fertilizer, plant growth regulator, bactericide and insecticide are mixed with peatmoss as occasion demands, and water-soluble glue is added to those. The fertilizer comprises N, P and K ingredients. The plant growth regulator comprises plant growth hormone, typically GA and NAA. Water-soluble glue is preferably vegetative cement or can be acryl cement. Peatmoss absorbed water by the mixture and can be pressed under wet

condition.

STEP 2

The mixture obtained from the above is pressed and formed to insert plant seed. Size and shape of the pellet depends on those of plant seed. The mixture can be pressed and formed by the wet peatmoss and water-soluble glue in the first step. Figure 11 shows the processes of pelletization according to the present invention.

STEP 3

The pressed and formed mixture obtained from the second step is dried at 25~80℃. At this time, a water content of the mixture is preferably 15~25% by weight. A drying method in the process of the present invention is preferably a hot wind drying method for mass production or a natural drying method. As the plant seed is inserted after drying, it prevents the germination of plant seed from water absorbed into the peatmoss. Therefore, the problem that is described in the above does not happen.

STEP 4

The dried mixture of the above step is made a hole by drill to insert the plant seed in that. Then plant seed is inserted into it, and a inserted hole is pressed and sealed with peatmoss or the mixture of the first step. In the process of the present invention, the drill is used to make a hole, however an device prepared for mass production is used, too.

The pelletization method of plant seed according to the present invention doesn't have incidental chemical reaction during mixing various materials such as fertilizer, plant growth regulator, bactericide and insecticide with peatmoss. In addition, the forming is free and its process is convenient. Also the present invention,

the pellet with plant seed doesn't have a physiological reaction by water. Furthermore, the pellet with plant seed, which is sown and is absorbed water, has 3 or 4 times volume than drying condition and can be used in a large-scale cultivation because peatmoss functions as a soil, therefore the pellet can be sown in a soil surface. In addition, said pelletization method can be used to the bulbous plants, which have not tried pelletization of plant seed.

[TABLE 1]

Comparison of the pelletization between the present invention and the Prior Art

	Pelletization method of the prior art	Pelletization method of the present invention
Target	Mainly micro plant seed	All kinds of plant seeds and bulbous plants
Purpose	Enlargement and uniformity for mechanization of sowing	Possibility of enlargement, uniformity, simplicity of cultivation and flight sowing.
Material	Mud, phosphate powder, lime powder, water-soluble Arabic gum	Peatmoss
Preparation and characteristic	1) Seed is prepared as a pellet by coating materials on its surface by using glue severally. 2) Expensive manufacturing equipments are needed.	1) Forming a mixture of additions and peatmoss, drying those, making a hole to said mixture, inserting plant seed into it, and pressing and sealing. 2) Preparation is very easy, simple manufacturing equipments are needed and it is possible to make it by hand.
Water drying	In the process of coating seed with various materials, wind or heat is used for drying, and the physiological activation problem happens because of water absorption into the seed in the preparing process.	The physiological activation problem does not happen because of forming using peatmoss and inserting the plant seed after drying.
Addition	It is possible to mix materials comprising fertilizer, plant growth regulator, bactericide, and insecticide, but to be happened inhibition effect by chemical reactions.	Such ingredients necessary for growth of plant seed as fertilizer, plant growth regulator, bactericide, and insecticide are easily mixed and there are no inhibition effects.

Physical and chemical characteristic	1) Aeration and moisture holding are not good. 2) The selection of material needs a caution because there is a possibility of incidental chemical reaction by coating materials.	1) Aeration and moisture holding is excellent. 2) Chemical inhibition reaction does not happen completely.
Sowing method	It is necessary to sow seed in the soil because pelletization materials do not function as a soil.	It is possible to sow seed in the soil surface as well as in the soil because peatmoss functions as a soil.
Hereafter possibility	Complement of defects is needed according to materials and applied plant seed.	It is possible to be applied widely in all kinds of plant seeds and bulbous plants. Also it can be practiced as soon as possible.

The present invention will be explained in more detail with reference to the below examples and experimental examples. However, it should be understood that the scope of the present invention is not limited thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1a is a graph that shows a germination rate on the first experiment according to various pelletization methods and sowing methods (experimental examples 1~8) in *Calendula officinalis* cv. Gold star seed;

Figure 1b is a graph that shows a germination rate on the second experiment according to various pelletization methods and sowing methods (experimental examples 1~8) in *Calendula officinalis* cv. Gold star seed;

Figure 2a is a graph that shows a germination rate on the first experiment according to various pelletization methods and sowing methods (experimental examples 1~8) in *Salvia splendens* cv. Hot jazz seed;

Figure 2b is a graph that shows a germination rate on the second experiment according to various pelletization methods and sowing methods (experimental examples 1~8) in *Salvia splendens* cv. Hot jazz seed;

Figure 3 is a graph that shows a germination rate according to various

pelletization methods and sowing methods (experimental examples 1~8) in *Glycine max* cv. Whanggeum seed;

Figure 4a is the first experiment graph that shows a change of germination population after sowing according to sowing methods in *Calendula officinalis* cv. Gold star seed that is not palletized;

Figure 4b is the first experiment graph that shows a change of germination population after sowing according to sowing methods in *Calendula officinalis* cv. Gold star seed with fertilizer-treatment only.

Figure 4c is the first experiment graph that shows a change of germination population after sowing according to sowing methods in *Calendula officinalis* cv. Gold star seed that is treated with fertilizer and GA;

Figure 4d is the first experiment graph that shows a change of germination population after sowing according to sowing methods in *Calendula officinalis* cv. Gold star seed that is treated with fertilizer and NAA;

Figure 5a is the second experiment graph that shows a change of germination population after sowing according to sowing methods in *Calendula officinalis* cv. Gold star seed that is not palletized;

Figure 5b is the second experiment graph that shows a change of germination population after sowing according to sowing methods in *Calendula officinalis* cv. Gold star seed with fertilizer-treatment only;

Figure 5c is the second experiment graph that shows a change of germination population after sowing according to sowing methods in *Calendula officinalis* cv. Gold star seed that is treated with fertilizer and GA;

Figure 5d is the second experiment graph that shows a change of germination population after sowing according to sowing methods in *Calendula officinalis* cv. Gold star seed that is treated with fertilizer and NAA;

Figure 6a is the first experiment graph that shows a change of germination

population after sowing according to sowing methods in *Salvia splendens* cv. Hot jazz seed that is not palletized;

Figure 6b is the first experiment graph that shows a change of germination population after sowing according to sowing methods in *Salvia splendens* cv. Hot jazz seed with fertilizer-treatment only;

Figure 6c is the first experiment graph that shows a change of germination population after sowing according to sowing methods in *Salvia splendens* cv. Hot jazz seed that is treated with fertilizer and GA;

Figure 6d is the first experiment graph that shows a change of germination population after sowing according to sowing methods in *Salvia splendens* cv. Hot jazz seed that is treated with fertilizer and NAA;

Figure 7a is the second experiment graph that shows a change of germination population after sowing according to sowing methods in *Salvia splendens* cv. Hot jazz seed that is not palletized;

Figure 7b is the second experiment graph that shows a change of germination population after sowing according to sowing methods in *Salvia splendens* cv. Hot jazz seed with fertilizer-treatment only;

Figure 7c is the second experiment graph that shows a change of germination population after sowing according to sowing methods in *Salvia splendens* cv. Hot jazz seed that is treated with fertilizer and GA;

Figure 7d is the second experiment graph that shows a change of germination population after sowing according to sowing methods in *Salvia splendens* cv. Hot jazz seed that is treated with fertilizer and NAA;

Figure 8a is an experiment graph that shows a change of germination population after sowing according to sowing methods in *Glycine max* cv. Whanggeum seed that is not palletized;

Figure 8b is an experiment graph that shows a change of germination population

after sowing according to sowing methods in *Glycine max* cv. Whanggeum seed with fertilizer-treatment only;

Figure 8c is an experiment graph that shows a change of germination population after sowing according to sowing methods in *Glycine max* cv. Whanggeum seed that is treated with fertilizer and GA;

Figure 8d is an experiment graph that shows a change of germination population after sowing according to sowing methods in *Glycine max* cv. Whanggeum seed that is treated with fertilizer and NAA;

Figure 9 is a photograph shows comparison of a pelletization between plant seeds and bulbous plants;

Figure 10 is a photograph shows a pelletization of plant seed;

Figure 11 is a photograph shows a sowing state of the pellet with plant seed according to the present invention;

Figure 12a is a photograph of the first experiment that shows a growth state of the pellet of *Calendula officinalis* cv. Gold star seed prepared by experimental examples 1~8 in two months after sowing;

Figure 12b is a photograph of the second experiment that shows a growth state of the pellet of *Calendula officinalis* cv. Gold star seed prepared by experimental examples 1~8 in two months after sowing;

Figure 13a is a photograph of the first experiment that shows a growth state of the pellet of *Salvia splendens* cv. Hot jazz seed prepared by experimental examples 1~8 in two months after sowing;

Figure 13b is a photograph of the second experiment that shows a growth state of the pellet of *Salvia splendens* cv. Hot jazz seed prepared by experimental examples 1~8 in two months after sowing;

Figure 14 is a photograph of the first experiment that shows a growth state of the pellet of *Glycine max* cv. Whanggeum seed prepared by experimental examples

1~8 in two months after sowing;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

To compare and analyze the effect of the pelletization using peatmoss, fertilizer and plant growth regulator, the pellets of *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum seeds were prepared by pelletization method mentioned hereinabove. Then, many growth states comprising germination rate, germination number day by day after sowing, plant height and leaf length were studied, took statistics and analyzed.

The first experiment was carried out from April 2002 to June 2002, and the second experiment was carried out from May 2002 to July 2002. The seeds of *Calendula officinalis* cv. Gold star and *Salvia splendens* cv. Hot jazz were carried out the first and the second experiments, and the seed of *Glycine max* cv. Whanggeum was carried out the first experiment only. The sowing was conducted to a rectangle plastic box for cutting by using clay sand. Intermediate fertilizer was not applied at all, and only watering was carried out as demands. Said processes were carried out 3 times repeatedly to one hundred of every seed.

Also, a planting of the prepared pellet was conducted by two sowing methods; one is a sowing method that is not necessary to cover with earth after sowing seed in the soil surface and the other is a sowing method that is necessary to cover with earth.

A shape of pellet depends on size and shape of plant seed; however, the pellets in the below examples were made to a spherical shape for a convenience of experiment. Pelletization treatment and planting method were carried out as follows.

EXAMPLE 1

The every seed of *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum was not pelletized and planted by a method

sowing seed in the soil surface.

EXAMPLE 2

Pellets, which were prepared by adding fertilizer ingredients consisting of 300mg/L of N, 200mg/L of P and 400mg/L of K with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil surface.

EXAMPLE 3

Pellets, which were prepared by adding fertilizer ingredients consisting of 300mg/L of N, 200mg/L of P and 400mg/L of K and 300ppm of GA with peatmoss, adjusting as pH by 5.8, adding a water-soluble glue, forming said mixture, inserting the *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil surface.

EXAMPLE 4

Pellets, which were prepared by adding fertilizer ingredients consisting of 300mg/L of N, 200mg/L of P and 400mg/L of K and 300ppm of NAA with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil surface.

EXAMPLE 5

The every seed of *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum was not pelletized and planted by a method sowing seed in the soil.

EXAMPLE 6

Pellets, which were prepared by adding fertilizer ingredients consisting of 300mg/L of N, 200mg/L of P and 400mg/L of K with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil.

EXAMPLE 7

Pellets, which were prepared by adding fertilizer ingredients consisting of 300mg/L of N, 200mg/L of P and 400mg/L of K and 300ppm of GA with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil.

EXAMPLE 8

Pellets, which were prepared by adding fertilizer ingredients consisting of 300mg/L of N, 200mg/L of P and 400mg/L of K and 300ppm of NAA with peatmoss, adjusting as pH 5.8, adding a water-soluble glue, forming said mixture, inserting the *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum seeds into it and then pressing them to a spherical shape were planted by the method sowing seed in the soil.

[TABLE 2]

Preparation of pellet by examples 1~8

Example	Fertilizer (mg/L)	Plant growth regulator	Peatmoss	pH	Sowing method
1	No	No	No	5.8	Sowing seed in the soil surface
2	N; 300 P; 200 K; 400	No[1)]	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil surface
3	N; 300 P; 200 K; 400	GA[2)] 300ppm	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil surface
4	N; 300 P; 200 K; 400	NAA[3)] 300ppm	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil surface
5	No	No	No	5.8	Sowing seed in the soil
6	N; 300 P; 200 K; 400	No	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil.
7	N; 300 P; 200 K; 400	GA 300ppm	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil
8	N; 300 P; 200 K; 400	NAA 300ppm	Pressing to a spherical shape after treatment	5.8	Sowing seed in the soil

[Footnote]
[1)] No ; no pelletization
[2)] GA ; Giberellin
[3)] NAA ; Naphthalene acetic acid

[TABLE 3]

Growth difference in the pellet of *Calendula officinalis* cv. Gold star seed treated by method of examples 1~8

Example	No. of leaves	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Root length (cm)	Fresh weight (g)	No. of flowers
The first experiment							
1	5.90 c[1)]	3.36 d	0.93 d	7.69 cd	6.95 bc	1.65 ab	0.07 ab
2	9.12 b	9.69 a	2.37 a	11.82 b	9.96 a	2.05 a	0.00 b
3	13.02 a	7.25 b	1.94 b	15.92 a	7.47 b	1.98 ab	0.00 b
4	0.83 e	0.81 f	0.23 e	1.97 f	3.07 e	1.51 b	0.14 a
5	5.84 c	4.05 d	1.54 c	6.48 d	6.13 cd	0.15 d	0.00 b
6	6.38 c	7.61 b	2.12 ab	8.95 c	7.03 bc	1.60 ab	0.00 b
7	8.86 b	4.95 c	1.37 c	8.79 c	5.33 d	0.67 c	0.00 b
8	2.05 d	1.51 e	0.44 e	4.40 e	2.84 e	1.80 ab	0.00 b
The second experiment							
1	1.27 d	1.30 c	0.41 d	2.41 e	1.30 d	0.11 c	0.00 b
2	7.84 a	6.46 a	1.55 a	10.94 c	12.40 a	3.49 b	0.00 b
3	8.64 a	6.19 a	1.82 a	16.59 a	12.36 a	3.55 a	0.02 b
4	0.00 e	0.00 d	0.00 e	0.00 f	0.00 d	0.00 c	0.00 b
5	4.34 c	4.29 b	1.01 c	7.40 d	7.23 c	0.57 c	0.00 b
6	6.20 b	5.81 a	2.15 b	12.85 b	8.36 c	2.93 b	0.05 a
7	5.45 b	6.31 a	1.59 b	13.36 b	10.66 b	2.76 b	0.00 b
8	0.09 e	0.12 d	0.01 e	0.18 f	0.10 d	0.01 c	0.00 b

[Footnote]
[1)] Mean separation within columns by Duncan's multiple range test at p=0.05.

[TABLE 4]

Growth difference in the pellet of *Salvia splendens* cv. Hot jazz seed treated by method of examples 1~8

Example	No. of leaves	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Root length (cm)	Fresh weight (g)	No. of flowers
The first experiment							
1	0.67 d[1)]	0.25 d	0.22 c	2.33 d	2.33 d	0.57 c	0.00 b
2	7.06 a	3.95 a	3.39 a	19.58 a	18.28 a	5.94 a	0.00 b
3	5.73 b	4.26 a	3.34 a	18.11 a	11.73 b	4.95 b	0.10 a
4	3.15 c	2.00 bc	1.66 b	7.80 b	5.29 c	1.46 c	0.04 b
5	4.96 b	1.44 cd	1.30 b	7.36 bc	10.60 b	1.07 c	0.00 b
6	2.46 c	3.16 ab	1.26 b	4.62 cd	4.88 c	1.45 c	0.00 b

7	3.04 c	1.90 bc	1.37 b	5.12 bcd	3.88 cd	1.13 c	0.00 b
8	1.08 d	0.67 cd	0.53 c	3.41 d	2.27 d	1.19 c	0.00 b
The second experiment							
1	3.43 c	1.33 c	0.81 c	3.41 c	4.92 c	0.17 bc	0.00 b
2	1.48 d	1.03 cd	0.60 c	2.69 c	1.79 d	0.57 b	0.00 b
3	7.14 a	6.31 a	2.68 a	15.46 a	12.57 b	2.24 a	0.00 b
4	0.00 e	0.00 d	0.00 d	0.00 d	0.00 d	0.00 c	0.00 b
5	4.60 b	1.15 cd	0.61 c	3.26 c	4.79 c	0.13 bc	0.00 b
6	0.24 e	0.25 cd	0.14 d	0.18 d	0.22 d	0.20 bc	0.02 b
7	3.60 c	3.04 b	1.80 b	6.96 b	14.64 a	2.55 a	0.24 a
8	0.00 e	0.00 d	0.00 d	0.00 d	0.00 d	0.00 c	0.00 b
[Footnote] [1)] Mean separation within columns by Duncan's multiple range test at p=0.05.							

[TABLE 5]

Growth difference in the pellet of *Glycine max* cv. Whanggeum seed treated by method of examples 1~8

Example	No. of leaves	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Root length (cm)	Fresh weight (g)	No. of flowers	No. of pods
1	0.81 d[1)]	2.76 f	1.81 f	6.82 f	6.08 e	1.68 b	0.71 e	0.00 c
2	4.06 bc	14.64 b	9.37 bc	47.22 d	19.24 b	9.74 b	2.55 bc	0.06 c
3	4.60 ab	12.09 c	8.58 bc	57.52 ab	14.20 c	6.57 b	1.48 d	0.61 a
4	1.27 d	4.34 e	3.06 e	11.04 f	6.87 e	4.48 b	0.90 e	0.06 c
5	4.28 bc	15.61 b	12.11 a	53.78 bc	22.94 a	5.42 b	2.82 ab	0.42 ab
6	5.07 ab	17.83 a	11.09 a	63.95 a	21.70 ab	11.00 b	3.43 a	0.29 b
7	3.47 c	8.38 d	6.13 d	47.57 cd	15.67 c	3.64 b	1.60 d	0.41 b
8	3.66 c	12.63 c	7.74 cd	37.00 e	10.33 d	22.40 a	2.39 c	0.48 ab
[Footnote] [1)] Mean separation within columns by Duncan's multiple range test at p=0.05.								

Effects of the pellet with plant seed according to the present invention are as

follows;

The pelletization treatment for the seeds of *Calendula officinalis* cv. Gold star, *Salvia splendens* cv. Hot jazz, and *Glycine max* cv. Whanggeum resulted in a far better growth than the control in number of leaves, leaf length, leaf width, plant height and root length etc. (Table 3, 4, 5). The germination rate of the palletized seeds was similar to the control (Figure 1a, 1b, 2a, 2b, 3), however, the pelletization treatment improved the growth state of plant seed after germination than the control because of fertilizing ingredients mixed with peatmoss. Therefore, in the case of *Calendula officinalis* cv. Gold star, number of leaves and plant height were more than twice than the control (Table 3). Particularly, *Glycine max* cv. Whanggeum had four times number of leaves and nine times plant height than the control (Table 5). The reason is judged as follows; the peatmoss, which is light and has an excellent aeration, makes oxygen supply necessary for germination smooth, the water potential of said peatmoss that is more than 60% of total volume in the watering or rain makes seed sufficiently wet and an absorption of mixed fertilizer makes nutrient supply smooth.

In comparison the growth of the pellet with plant seed of the present invention according to sowing methods, in the cases of the pellets of *Calendula officinalis* cv. Gold star seed and *Salvia splendens* cv. Hot jazz seed, the state of growth of those seeds sown in the soil surface (Example 1~4) was more excellent than the seeds sown in the soil ithe respects (Table 3, 4, 5). The state of growth of *Glycine max* cv. Whanggeum seed was similar according to sowing methods; the reason is thought as an effect by supply of nitrogen ingredient carried out by leguminous bacteria in a root of bean (Table 5). In the treatment of sowing seed in the soil surface, the germination rate was high (Figure 1, 2, 3) and a germinating day was quick (Figure 5, 6, 7, 8). The reason of said characteristics is that the peatmoss surrounding the pellet of plant seed sown in the soil surface substitutes for soil

sufficiently, as a result of that, the plant seed is germinated normally as if it were in the soil.

In comparison the growth of the present invention according to plant growth regulators treated with seeds, in the cases of the pellets of *Calendula officinalis* cv. Gold star seed and *Salvia splendens* cv. Hot jazz seed, the growth state of the seeds treated with GA was more excellent than the plants treated with NAA (Table 3, 4). In the case of the pellet of *Glycine max* cv. Whanggeum, the plant height of the seeds treated with GA, which had been sown in the soil surface was five times as long as that of seeds treated with NAA and said result showed a complete physiological characteristic of GA. In the sowing seed in the soil, some seeds treated with NAA had more excellent results but the reason of said results is thought as the effect of leguminous bacteria (Table 5). Also, in the germination number, the pellets of *Calendula officinalis* cv. Gold star seed and *Salvia splendens* cv. Hot jazz seed were that the seeds treated with GA had a higher number than the seeds treated with NAA (Figure 1, 2). However, the pellet of *Glycine max* cv. Whanggeum seed showed a similar result compared with the case of sowing seed in the soil between the seed treated with GA and the seed treated with NAA (Figure 3). The germinating day of the pellet of *Glycine max* cv. Whanggeum seed showed a similar tendency to the germination number (figure 1, 2, 3). Said results indicat9XGA causes a diapauses breaking of plant seed, the germination, stem growth and flowering and NAA causes a rooting reaction.

In said examples, the pellet added fertilizer and the pellet added fertilizer and GA showed far excellent growth states and the facts mentioned above are thought on account of fertilizing ingredients mixed with the pellet and a supply of GA. The present invention, the sowing method of the pellet of plant seed is effective when it is carried out in the soil surface and in the case of *Glycine max* cv. Whanggeum seed, the sowing seed in the soil is effective.

In synthesis of the results mentioned above, the pelletization of plant seed according to the present invention improved the growths of seed comprising germination rate, germination after planting and germinating day etc. than the control, the sowing method in the soil surface was effective than the sowing method in the soil and GA as plant growth regulator resulted in an excellent growth. Therefore, a superiority of the present invention is proved by said results.

INDUSTRIAL APPLICABILITY

As explanations mentioned hereinabove, the pelletization method of plant seed according to the present invention by mixing materials consisting of fertilizer, plant growth regulator with peatmoss, drying said mixture and inserting the plant seed into it, has no problem by chemical reaction in said process. And the pellet with plant seed prepared by said method prevents physiological reaction of seed from removal of water within a pellet, therefore the growth of plant after germination is remarkably excellent. In addition, the present invention can be used for bulbous plants and makes a large-scale Air sowing possible because the germination rate of the pelletized seed is high without covering with earth again after sowing seed in a soil surface. Therefore, the present invention is a distinguished invention in industries comprising agriculture and gardening.